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CIVIL ENGINEERS

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BOSTON SOCIETY OF CIVIL ENGINEERS

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Editor — WILLIAM L. BUTCHER
715 Tremont Temple, Boston

Vol. IX APRIL, 1922 No. 4

BOSTON SOCIETY OF CIVIL ENGINEERS
FOUNDED 1848

PROCEEDINGS

PAPER IN THIS NUMBER.

"Address at the Annual Meeting." Robert Spurr Weston.

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Contributors are hereby notified that proof will not be submitted to them for examination unless requested before the 10th of the month preceding the month of publication.

MINUTES OF MEETINGS.

BOSTON, March 15, 1922. — The seventy-fourth annual meeting of the Boston Society of Civil Engineers was called to order at 5.15 o'clock P.M. at the Boston City Club, by the President, Robert Spurr Weston.

The records of the meetings of February 15 and 28 were read and approved.

The President announced that the Board of Government had elected the following to membership in the grades named:

Members — Messrs. Arthur D. Dickson, William H. Fowler, George H. P. Gannon, Samuel Hobbs and J. Merrill Hanley.

Juniors — Mr. Henry M. Wilkins.

The President announced that the result of the letter ballot on the question of passing the resolution to join the Affiliation of

Technical Societies showed that 265 members were in favor thereof and 6 opposed, and that the resolution was therefore carried.

The President also announced that the result of the letter ballot endorsing a bill before Congress providing that Engineers in the Public Health Service should be commissioned showed that 228 members voted in favor and 13 opposed, and therefore the Society endorsed the bill.

The Annual reports were then taken up.

The President read the annual report of the Board of Government which was accepted and placed on file.

The reports of the Treasurer, Secretary, Librarian, Committee on Licensing Engineers, and Social Activities were read and on motion of Col. Gunby it was voted that these annual reports be accepted, recommendations adopted and be printed in the JOURNAL.

On motion of Past President Hodgdon it was voted that the incoming Board of Government be authorized to appoint such committees as it deems best.

The tellers of election presented their report of the election and in accordance therewith the President announced that the following officers had been elected for the ensuing year:

President — Dugald C. Jackson.
Vice-President (for two years) — Charles M. Allen.
Secretary — John B. Babcock, 3rd.
Treasurer — Frank C. Whitney.
Directors (for two years) — Herbert N. Cheney and Frank A. Marston.
Members of Nominating Committee (for two years) — Bertram Brewer, George A. Sampson and Henry A. Varney.

The President announced that the Desmond FitzGerald Medal for the year had been awarded to Mr. Harold K. Barrows for his paper on "Water-Power Development in New England."

The President announced that the Board of Government had awarded a copy of "Frontinus and the Water Supply of Rome" to Past President Charles R. Gow, for his paper on "The Responsibility of Organized Labor for the Stagnation in

the Building Industry." A copy of this book will be awarded annually in accordance with a gift of Mr. Clemens Herschel.

The President then delivered his annual address on "Some Engineering Practices and Ideals" which will be printed in the April JOURNAL.

The Business meeting thereupon adjourned and the members attended the supper and entertainment provided by the Social Activities Committee.

There were 163 members and guests present.

Adjourned at 10.30 P.M.

RICHARD K. HALE, *Acting Secretary.*

ANNUAL MEETING OF THE DESIGNERS SECTION.

BOSTON, March 8, 1922. — The Annual Meeting of the Designers Section was called to order at 6.05 P.M. by the Chairman, Ralph E. Rice. There were 16 members present.

The annual report of the Executive Committee was read and accepted.

The minutes of the previous meeting were read and approved. The report of the Nominating Committee was then read and by unanimous vote of the Section one ballot was cast electing the following officers nominated.

Chairman — Arthur L. Shaw.
Vice-Chairman — Howard C. Thomas.
Clerk — Waldo F. Pike.
Executive Committee —
Ralph E. Rice.
Walter W. Clifford.
John J. Harty, Jr.

After a few words by the retiring Chairman, the new Chairman, Mr. Arthur L. Shaw, assumed his office.

The first speaker of the evening was Mr. L. W. Marsh of the Johns-Manville Company. Mr. Marsh gave a very interesting talk on "Roof Coverings" beginning with the primitive thatched roofs and ending with the modern asbestos felt saturated with

asphalt. Samples were shown and methods of laying the roofing were shown with the lantern.

The next speaker was Mr. Fred Murtfeldt, of the W. A. Murtfeldt Company. Mr. Murtfeldt spoke from the standpoint of a practical roofer with many years of experience. He spoke in a general way of the advantages and disadvantages of various types of roofing and illustrated part of his talk with the lantern.

The meeting was adjourned at 8.35 P.M.

WALDO F. PIKE, *Clerk.*

ANNUAL REPORTS.

REPORT OF THE BOARD OF GOVERNMENT FOR THE YEAR 1921–1922.

BOSTON, March 15, 1922.

To the Boston Society Civil Engineers:

Pursuant to the requirements of the Constitution, the Board of Government presents its report for the year ending March 15, 1922.

Membership.

During the year 27 members have resigned, 35 have forfeited membership for non-payment of dues, 6 juniors have lost membership because of age limit, and 10 have died, making the total deductions 78.

One hundred members in all grades have been added during the year, of whom 3 were former members reinstated, and 2 juniors and 1 associate have been transferred to the grade of member.

The present membership of the Society consists of 7 honorary members, 779 members, 83 juniors, 28 associate, and 5 who are members of the Sanitary Section only, making a total membership of 902.

Deaths.

The loss by death during the year has been 10, as follows: —

John F. Monaghan, April 18, 1921.
S. Everett Tinkham, April 21, 1921.
Frank J. Nowell, May 25, 1921.
Richard Hutchinson, June 15, 1921.
Roy C. Aiken, June 24, 1921.
Herbert C. Bacon, August 27, 1921.
Charles E. Haberstroh, September 25, 1921.
Hiram F. Mills, October 4, 1921.
William E. Baker, November 7, 1921.
Charles A. Pearson, December 11, 1921

Remission of Dues.

Under authority of By-Law 8, the Board of Government has remitted the dues of 7 members.

Regular Meetings.

Eight regular meetings, one adjourned meeting, one special and two joint meetings have been held during the year, and an inspection trip to Watertown Arsenal and Outing at Norumbega Park which took the place of the regular meeting in the month of June.

The average attendance at these meetings was 95, the largest being 300, and the smallest 33.

At these meetings papers and addresses have been given, or special discussions held, as follows:

March 16, 1921. — Address of the retiring President, Frank A. Barbour, "The Engineer in the Service of the Public."

March 24, 1921. — Special meeting. Col. Charles R. Gow, "Responsibility of Organized Labor for the Present Stagnation in the Building Industry."

April 20, 1921. — Mr. Walter E. Spear, "Public Works in Modern Greece." Illustrated by lantern slides.

May 18, 1921. — Regular meeting. Not a quorum present. Adjourned.

May 25, 1921. — Adjourned meeting. Mr. Desmond FitzGerald, "Something about the Canyons of Utah," illustrated by lantern slides.

September 21, 1921. — Tinkham Memorial meeting. J. K. Berry, Esq., "Mr. Tinkham's Masonic Career." Past President, Frederic H. Fay, "Mr. Tinkham's Career as an Engineer." Past President, Edward E. Howe, "Mr. Tinkham's Personal Life while a Young Man." Past President, Desmond FitzGerald, "Mr. Tinkham's Conection with the Boston Society."

October 19, 1921. — Mr. George C. Danforth, Chief Engineer of the Maine Water Power Commission, "The Federal Water Power Act."

November 16, 1921. — Discussion, "Labor Problems of Today," by James Gauld, Carpenters' District Council; E. A. Johnson, Secretary, Building Trades Council.

The following gentlemen took part: William Stanley Parker, Architect; Morton C. Tuttle, Aberthaw Construction Co.; Charles R. Gow, Charles R. Gow Co.

December 21, 1921. — Mr. Arthur W. Dean, Chief Engineer, Division of Highways of the Public Works Department, Commonwealth of Massachusetts, "Highway Construction in Massachusetts."

Discussion opened by Mr. John R. Rablin, Chief Engineer Park Division, Metropolitan Park Commission.

January 25, 1921. — Mr. Thomas C. Atwood, of the T. C. Atwood Organization, of Raleigh, N. C., "Special Methods of Handling Cost-Plus Work for a Southern University."

February 15, 1922. — First Joint meeting, with the American Society of Mechanical Engineers and the American Institute of Electrical Engineers. Mr. Gerrit Fort, Vice-President of the Boston & Maine Railroad, "Problems of Freight Transportation in New England"; and Mr. Benjamin Franklin Fitch, of the Motor Terminals Company, of New York, "Coördination by the Unit Container System by the Railways, Waterways, Highways and Traction Lines for a relief of New England Transportation."

February 28, 1922. — Second Joint meeting. Hon. John N. Cole, Commissioner of Public Works, Commonwealth of Massachusetts, "Problems due to the Growth of the Motor Truck as a Freight Carrier"; and Prof. W. K. Hatt, Director of the Advisory Board on Highway Research, "General Situation in Highway Transport and the Need of Research in that Field."

Sanitary Section Meetings.

The Sanitary Section has held four meetings during the year. The following papers have been presented before this body:

March 2, 1921. — Report of Committee on "Methods of Design and Construction and Results of Operation of Inverted Syphons for carrying Sewage only and for Storm Water", Prof. Dwight Porter.

Also report of Committee on "Proposed Rules and Regulations of the Special Plumbing Board."

October 5, 1921. — "Rain-Fall and Run-Off from the Storms of June 28-July 2, and July 9 to 11, 1921."

Discussion opened by Mr. Frank A. Marston, of Metcalf & Eddy, Consulting Engineers.

December 7, 1921. — Mr. Ralph W. Loud, Assistant Engineer, Metropolitan Sewerage Works, "The Metropolitan Sewerage Works."

January 4, 1922. — Mr. J. Frederick Jackson, Director, and Mr. J. Doman, Asst. Engr., Connecticut State Department of Health, "Characteristics of some Connecticut Sludges."

The average attendance at these meetings was thirty-four.

Designers Section.

The Designers Section have held eight meetings during the year, with an average attendance of twenty-four.

The following papers have been presented:

March 9, 1922. — Prof. Edward H. Rockwell, of Tufts College, "A New Method of Designing Rigid Concrete Frames with Special Reference to Interior and Wall Columns."

April 13, 1921. — Mr. W. F. Gilcreast, of Waldo Bros. & Bond, and Mr. F. G. Ring, Director of Refining Engineering, "Construction of the Refinery of the New England Oil Corporation at Fall River."

May 11, 1921. — Mr. Henry C. Sheils, "Some Criticisms of Construction Specifications."

October 14, 1921. — Mr. Edward H. Cameron, of Jackson & Moreland, "Methods of Treating Turbine Foundations"; Vice-Chairman, Edwin S. Parker, "Design of the Foundations for the Great Press in the new Post Building."

December 14, 1921. — Prof. George F. Swain, "Earth Pressure."

January 11, 1922. — Mr. A. C. Bartlett, Ventilating Engineer, and Secretary of the Boston Chapter of the A.S.H.&V.E., "What is Ventilation?" Mr. F. A. Alden, Member, A.S.M.E., and Sales Manager for the Pierce, Butler & Pierce Manufacturing Corporation, "Practical Design and Installation of Heating and Ventilating Equipment."

Permanent Fund.

Owing to the prevailing high prices the Society at the October meeting authorized the Board of Government to use the income from the Permanent Fund to meet current expenses to such an extent as they deemed necessary.

Notification has been received that Hiram F. Mills, who died October 4, 1921, left the Society one thousand dollars, but no details in regard to the conditions of the bequest have been announced.

Tinkham Memorial Fund.

The Committee on a Memorial to Samuel Everett Tinkham reported to the Board of Government on September 21, 1921, recommending the creation of a fund for a scholarship or fellowship in research work to be known as the "S. E. Tinkham Memorial Fund." The report was accepted and contributions asked for. It is hoped that $6 000 will be raised.

The standing of these funds will be found in the report of the Treasurer.

Journal.

The report of the editor of the JOURNAL for the calendar year 1921 shows that there have been printed ten issues of 1250 copies each, comprising 674 pages. The net cost of the JOURNAL was $3 537.91 or $5.25 per page.

In 1920 the net cost was $2 944.95 or $4.71 per page, there being 625 pages.

The cost of printing has remained at a high level during the year but it is expected that it will be reduced during 1922.

Award of the Desmond FitzGerald Medal.

In accordance with the recommendations of the Committee appointed to award the medal for the best paper by a member of the Society, published during the year ending September, 1921, the Board has awarded the medal to Harold K. Barrows for his paper entitled "Water Power Development in New England." which was published in the January, 1921, JOURNAL.

The Federated American Engineering Societies.

On March 15, 1921, the Society voted to join the Federated American Engineering Societies, with the understanding that the cost of membership should be defrayed by voluntary subscription. So far 180 members have contributed $439.70 leaving a deficit of $388.51.

The amount collected averaged $2.44 per contributor, but only 55 cents per member, — i.e., one fifth of the membership contributed more than one half of the necessary amount. Membership in the Federation costs $1 per member per year, and the Board of Government believes that the new organization is necessary both for the individual engineer and the public, and that it is the duty and privilege of this Society to support its work. A Committee has been appointed to solicit subscriptions to meet the deficit, and it is hoped that, in the interests of democracy, its appeal will meet with a generous response from those who have not yet contributed.

On January 19, Mr. L. W. Wallace, Executive Secretary, appeared at a meeting of your Board of Government, and gave an authentic account of the accomplishments of the Federation, and of its plans for the future. It is planned that Dean M. E. Cooley, of the University of Michigan, who succeeded Herbert Hoover as President of the Federation, will visit Boston later in the year, and inform our Society further. He has just returned from a successful

visitation of the member societies in the west and southwest. Mr. Wallace succeeded in convincing his hearers, and we feel sure that Dean Cooley will convince every one that the Federation ought to be supported.

Inter-Society Relationship.

The most important and far reaching steps in the history of the Society have been taken this year towards a closer coöperation among all the Technical Societies of Boston.

At the June meeting the Society approved a change in the By-Laws which authorized the Board of Government to form affiliate sections. Under this provision the Northeastern Section of the American Society of Civil Engineers became in December the American Society of Civil Engineers Section.

The Northeastern Section of the American Society of Civil Engineers was organized on November 12, 1921, at a meeting held at the Boston City Club, at which time the Constitution and By-Laws were adopted, and the following officers elected:

Chairman — Frank B. Sanborn.
Vice-Chairman — Walter C. Voss.
Secretary-Treasurer — Charles W. Banks.
Executive Committee —
Leonard C. Wason and J. H. Manning.

The first regular meeting was held on January 28, 1922, at the Boston City Club with an attendance of 71.

The membership in this Section now numbers 65 which includes 22 who are not members of the Boston Society.

Under the same provision the Engineering Society of the Northeastern College became, on December 21, 1921, the Northeastern College Section of the Boston Society.

During the year many meetings were held with representatives of the several technical societies with the view of forming an affiliation for mutual benefit. These meetings culminated in the formation of a tentative constitution and by-laws which were submitted to the membership of all the societies during January.

This motion was unanimously adopted at the February meeting of the Society and submitted to the membership by letter ballot. The result of this ballot which has just been announced is a vote of 228 in favor of and 13 against the Society taking part in this movement.

Society Activities.

The high level at which prices have been maintained has been severely felt by the Society. The expenses have been increasing for several years faster than the income and this year, for the first time, there is a deficit in excess of the income from the Permanent Fund.

Such a condition, of course, cannot be maintained. It is essential if the Society is to maintain its position that the cost of operating the Society per member be reduced or that the income be increased. If neither of these can be done the activities of the Society must be reduced to bring the costs below the income.

Social Activities.

The Committee on Social Activities have continued their excellent programs and have provided light suppers in the Society rooms before the meetings. This has proved a very popular feature and has been well patronized by members.

For the Board of Government,

ROBERT SPURR WESTON, *President.*

REPORT OF THE TREASURER.

BOSTON, March 1, 1922.

To the Boston Society of Civil Engineers:

Your Treasurer presents the following report for the year ending March 1, 1922.

Detailed data are contained in the appended tabular statements; Table 1 gives the receipts and expenditures for the year; Table 2, Comparative Balance Sheets; Table 3, Investment of the Permanent Fund.

The current expenses for the year amount to $12 757.07 being $1 622.63 increase over the preceding year.

There has been transferred to the Current Fund from income for current Expenses carried over from last year $828.30 also all the income of the Permanent Fund for the current year, amounting to $2 355.00, a total of $3 183.30. The deficit of $720.41 includes $388.51 on account of membership in the Federated American Engineering Societies.

The net expense of the JOURNAL has been $422.71 more than last year. The income from advertisements decreased $7.50 and the sale of JOURNALS has been $120.15 less than last year, otherwise the JOURNAL expenses would show an increase of $295.06.

There has been an increase in the Permanent Fund of $750.00 after transferring the income for the current year of $2 355.00 to the Current Fund.

Ten Coöperative Bank Shares have been withdrawn, valued at $1 656.10.

Respectfully submitted,

F. O. WHITNEY, *Treasurer.*

Table 1. — Receipts and Expenditures.

current fund.

Receipts.

Balance, March 1, 1921	$828.30
Members' Dues	7 001.93
Advertisements	1 153.00
Sale of Journals	158.07
Interest on Bank deposits	17.21
Furniture sold	49.50
Miscellaneous	33.95
Federation subscriptions	439.70
Income from Permanent Fund	2 355.00
	$12 036.66

Expenditures.

Journal	$4 771.28
Printing, stationery, postage, etc.	634.31
Rent (net)	2 524.96
Light	54.61
Salaries (except Editor)	2 695.00
Reporting	55.00
Stereopticon	21.00
Binding	130.65
Periodicals	172.15
Incidentals and Repairs	283.83
Insurance	35.30
Annual meeting and smoker	216.35
Social activities	127.11
Furnishing	54.15
Federated American Engineering Societies	828.21
Sanitary Section	73.29
Designers Section	36.35
Northeastern College Section	3.00
Northeastern Section	30.52
	$12 757.07
Deficit	720.41
	$12 036.66

Permanent fund.

Receipts.

Balance March 1, 1921	$43.81
Entrance fees	650.00
Interest received (net)	1 880.50
Coöperative bank shares withdrawn	1 656.10
Contribution	100.00
	$4 330.41

Expenditures.

Coöperative bank dues	$760.00
3 shares Am. Tel. & Tel. Co. purchased	297.75
Income transferred to Current Funds	2 355.00
Balance	917.66
	$4 330.41

E. K. TURNER LIBRARY FUND.

Receipts.

Cash on hand March 1, 1921	$103.37
Interest on bond	50.00
	$153.37

Expenditures.

Books purchased	$64.10
Balance	89.27
	$153.37

TINKHAM MEMORIAL.

Receipts.

Contributions received	$1 965.50
Interest on bonds	35.00
	$2 000.50

Expenditures.

Portrait for library	$50.00
Bonds purchased	1 495.00
Accrued interest on bonds	41.39
Balance	414.11
	$2 000.50

TABLE 2. — COMPARATIVE BALANCE SHEETS.

Assets.	March 1, 1919.	March 1, 1920.	March 1, 1921.	March 1, 1922.
Cash	$487.12	$339.49	$975.48	$286.52
Bonds and notes	35 023.00	35 523.00	35 523.00	35 523.00
Stock	1 950.00	1 950.00	1 950.00	2 247.75
Coöperative banks	7 179.65	8 501.75	8 159.45	7 737.85
Library	7 500.00	7 500.00	7.500.00	7 500.00
Furniture	2 405.11	2 405.11	2 405.11	2 405.11
	$54 544.88	$56 213.35	$56 513.04	$55 700.23
Liabilities.				
Permanent Fund	$43 467.51	$43 852.51	$44 682.51	$45 432.51
E. K. Turner Fund	1 063.22	1 058.72	1 097.12	1 083.02
Unexpended appropriations	.....	927.45	.....	.....
Current Funds	109.04	.....	828.30	*720.41
Unpaid bills	.....	469.56	.....	.....
Surplus	9 905.11	9 905.11	9 905.11	9 905.11
	$54 544.88	$56 213.35	$56 513.04	$55 700.23

*Deficit.

TABLE 3. — INVESTMENT OF PERMANENT FUND, MARCH 1, 1922.

Bonds.	Par Value.	Actual Cost.	Value as carried on Books.
American Tel. & Tel. Co. Col. Tr. 4%,1929	$3 000.00	$2 328.75	$2 737.50
Union Elec. Light & Power Co. 5%, 1932	2 000.00	2 050.00	2 050.00
Blackstone Valley Gas&Elec. Co. 5%,1939	2 000.00	1 995.00	1 995.00
Dayton Gas Co. 5%, 1930	2 000.00	2 000.00	2 000.00
Milford & Uxbridge St. Ry. 7%, 1923	3 000.00	2 942.50	2 942.50
Railway & Light Securities Co. 5%, 1939	3 000.00	3 000.00	3 000.00
Superior Light & Power Co. 4%, 1931	4 000.00	3 347.50	3 347.50
Wheeling Electric Co. 5%, 1941	4 000.00	3 845.00	3 845.00
Economy Light & Power Co. 5%, 1956	1 000.00	990.00	990.00
Tampa Electric Co. 5%, 1933	2 000.00	2 000.00	2 000.00
Galveston Houston Elec. Ry. Co. 5%, 1954	2 000.00	1 940.00	1 940.00
Northern Texas Elec. Co. 5%, 1940	2 000.00	1 932.50	1 932.50
Chicago & Northwestern Ry. 5%, 1987	1 000.00	1 102.50	1 102.50
Vermont Power & Mfg. Co. 5%, 1928	1 000.00	965.00	965.00
American Tel. & Tel. Co. 5%, 1946	1 000.00	993.75	993.75
United States Liberty Loan 3½%, 1947	2 000.00	2 000.00	2 000.00
American Tel. & Tel. Co. 6%, 1925	200.00	188.00	188.00
United States Victory Loan, 4¾%, 1923	500.00	500.00	500.00
	$35 700.00	$34 120.50	$34 529.25
Stock.			
18 Shares Am. Tel. & Tel. Co.	1 800.00	2 247.75	2 247.75
Total securities	$37 500.00	$36 360.25	$36 777.00

Coöperative Banks.

15 shares Merchants Coöperative Bank, including interest to March	$1 997.00	
15 shares Volunteer Coöperative Bank, including interest to January	2 022.30	
25 shares Watertown Coöperative Bank including interest to March	3 718.55	7 737.85
Total value of invested funds		$44 514.85
Cash		917.66
		$45 432.51

E. K. Turner Fund.

Am. Tel. & Tel. Co. 5%, 1946	$1 000.00	$993.75	
Cash on hand		89.27	1 083.02
Total value of Permanent Funds			$46 515.53

Tinkham Memorial.

Connecticut Light & Power Co. 7%, 1951	1 000.00	1 020.00	1 020.00
Shawinigan Water & Power 6%, 1950	500.00	475.00	475.00
Cash			414.11
			$1 909.11

We have examined the above report and found it correct.

JOHN E. CARTY,
HENRY B. WOOD,

Auditing Committee of Directors of the Boston Society of Civil Engineers.

Report of the Acting Secretary.

Boston, March 1, 1922.

Richard K. Hale, Acting Secretary, *in account with the* Boston Society of Civil Engineers, *Dr.*

For cash received during the year ending March 1, 1922:

From entrance fees, new members and transfer:			
33 new members and associates	at $10,	$330.00	
62 juniors	at 5,	310.00	
2 juniors transferred to members	at 5,	10.00	
Total from entrance fees			$650.00
From annual dues for 1921–22, including dues from new members		$6 934.93	
From back dues		14.00	
From dues for 1922–23		53.00	
Total from dues			$7 001.93
From rents			2 055.00
From advertisements			1 153.00
From sale of Journals and reprints			158.07
From library fines			9.24
From sale of old paper			9.33
From telephone (N.E.W.W.A.)			14.21
From Engineers' Dinner refund			1.17
From sale of book cases			49.50
From contribution to building fund			100.00
From contributions towards Federation			439.70
From binding Journals			61.30
Total			$11 702.45

The above amount has been paid to the Treasurer, whose receipts the Acting Secretary holds.

Richard K. Hale, *Acting Secretary.*

We have examined the above report and found it correct.

John E. Carty,
Henry B. Wood,
Auditing Committee of Directors of the Boston Society of Civil Engineers.

Report of the Library Committee, 1921–22.

Boston, Mass., March 15, 1922

To the Boston Society of Civil Engineers:

The Librarian submits for the Library Committee the following report for the year 1921–1922:

Since the last report 132 bound volumes and 128 pamphlets have been added to the library making a total of 260 accessions. We now have a library of about 10 000 bound volumes and 3 400 pamphlets.

During the year 284 books have been loaned to members, and fines to the amount of $9.24 have been collected. In addition to this we have had an average of at least thirteen people per day come in to read or study so that we feel that our library has been very well used.

There have been inquiries of all kinds come in, both from members and non-members, for information on various lines, some of which could be readily answered and others required a good deal of research.

The Committee have purchased from the Turner Fund the following books on engineering subjects to be added to Section 10: "American Civil Engineers' Handbook," by Merriman; "Architects' and Builders' Handbook," by Kidder and Nolan; "Concrete Work," Vol. 1., by Hatt and Voss; "Construction of Roads and Pavements," by Agg; "Design of Highway Bridges," by Ketchum; "Engineering Drawing," by French; "Engineering Geology," by Ries and Watson; "Fire Prevention and Fire Protection," by Frietag; "Fresh-Water Biology," by Ward and Whipple; "Graphical Analysis," by Wolfe; "Handbook of Hydraulics," by King; "Materials of Construction," by Johnson, Aston & Withey; "Mechanics of Engineering," by Church; "Method of Least Squares," by Merriman; "Mechanical Equipment of Buildings," Vol. 2, by Harding and Willard; "Modern Framed Structures," 3 volumes, by Johnson, Bryan and Turneaure; "Practical Astronomy," by Hosmer; "Pumping Engines for Water Works," by Hague; "Steel Mill Buildings," by Ketchum; "Waterworks Management and Maintenance," by Hubbard and Kiersted.

They have also ordered the following which will not be received in time to be included in the Treasurer's report this year:

"Value for Rate Making," by Floy; "Timber Framing," by Dewell; "Quebec Bridge Report," 2 vols., and Engineering News Index, Nos. 2, 3, 4 and 5.

The following books have been contributed by publishers and authors: "Collection and Disposal of Municipal Waste," by Greeley and Hering; "Concrete Designers' Manual," by Hool and Johnson; "Handbook of Construction Equipment," by Dana; "Location, Grading and Drainage of Highways," by Wilson and Harger; "Practical Least Squares," by Deland; "Sewerage and Sewage Disposal,'" by Metcalf and Eddy; "Waste in Industry," by Committee on Elimination, F.A.E.S.; "Boiler Code," "Heat Transfer", "Marine Steam", "Principles of Combustion,' and "Steam" by Babcock & Wilcox.

Gannett's "Geographic Tables and Formulæ," and Dunnack's "Maine Book," have been given by members of the Society, and Clemens Herschel has contributed the following to the Herschel Library: "American Engineers in France" by Parsons; "Further Incidents in the Life of a Mining Engineer" by MacCarthy; "Life of George Westinghouse" by Prout, and "Plan of New York State Barge Canal" for our general library.

It is hoped and expected that all our books will be so arranged as to be available for use during this next year. This work must necessarily be rather slow of accomplishment both on account of the study required to properly place them and on account of the many calls on the time of the assistant librarian.

The Catalogue Equipment and Supply Company have continued keeping up to date the collection of trade catalogs placed in our library, and pocket indexes to these catalogs will be furnished to members on request.

Respectfully submitted,

RICHARD K. HALE, *Librarian.*

REPORT OF THE EXECUTIVE COMMITTEE OF THE SANITARY SECTION.

BOSTON, MASS., March 1, 1922.

To the Sanitary Section, Boston Society of Civil Engineers:

During the past year four meetings were held, the subjects and speakers being as follows:

March 2, 1921. — Report of Committee on "Methods of Design and Construction, and Results of Operation of Inverted Siphons for Carrying Sewage Only and for Storm Water."

October 5, 1921. — "Rainfall and Run-Off from the Storms of June 28; July 2 and July 9 to 11, 1921." Discussion opened by Frank A. Marston.

December 7, 1921. — "Metropolitan Sewerage Works" by Ralph W. Loud.

January 4, 1922. — "Characteristics of Some Connecticut Sludges" by J. Frederick Jackson and Joseph Doman.

The attendance at the meetings has averaged 34 during the year.

The annual excursion was omitted this year and the Section joined the main Society in an outing to Norumbega Park.

Of the papers presented, two have been printed in the JOURNAL and it is hoped to obtain the manuscript for another.

There is now one special committee in the Section, the committee on Methods of Design and Construction and Results of Operation of Submerged Pipe Lines for Outfall Sewers. It is expected that this committee will make its final report at the annual meeting this year.

Five new members have been added during the year making the present total membership 198.

Respectfully submitted,

For the Executive Committee by

JOHN P. WENTWORTH, *Clerk.*

REPORT OF THE EXECUTIVE COMMITTEE OF THE DESIGNERS SECTION.

BOSTON, March 1, 1922.

To the Designers Section of the Boston Society of Civil Engineers:

During the past year, eight regular meetings of the Designers Section have been held. The average attendance has been 24, and a large variety of subjects has been covered. The following list shows the dates of meetings, names of speakers and their subjects.

March 9, 1921. — Prof. E. H. Rockwell, "Methods of Designing Rigid Concrete Frames."

April 13, 1921. — Mr. W. F. Gilcreast, and Mr. F. G. Ring, "Construction and Operation of the Fall River Plant of the New England Oil Corporation."

May 11, 1921. — Mr. H. C. Sheils and Mr. J. E. Carty, "Some Criticisms of Construction Specifications."

October 14, 1921. — Mr. E. H. Cameron, "Steam Turbine Foundations;" and Mr. E. S. Parker, "The Boston Post Press Room Floor."

November 22, 1921. — Mr. E. D. Mortenson, "Design of Concrete Oil Tanks."

December 14, 1921. — Prof. G. F. Swain, "Earth Pressure."

January 11, 1922. — Mr. A. C. Bartlett and Mr. F. O. Alden, "Heating and Ventilating."

February 8, 1922. — Mr. O. A. Olstad, "Steel Forms."

The membership in the Section has increased to seventy-three during the year and an effort has been recently made by means of circulars, to interest new members of the Society in the activities of this Section.

Respectfully submitted,
For the Executive Committee, by

A. L. SHAW, *Clerk.*

REPORT OF THE COMMITTEE ON SOCIAL ACTIVITIES.

BOSTON, MASS., March 15, 1922.

To the Boston Society of Civil Engineers:

We beg to submit herewith our report on the Social Activities of the Society for the current year.

After careful consideration, and discussion with many of the members of the Society, it was decided to give up the customary all day joint outing which has been held for a number of years with the New England Water Works Association, and to substitute in its stead an afternoon trip of inspection through the Hood Rubber Company's factory and the Watertown Arsenal, followed by supper and a baseball game at Norumbega Park. The reasons for this decision were the absence of enthusiasm for the all day outing except

among those who were also members of the Water Works Association, the very small attendance at the recent outings by our members and the fact that many of the younger members could not afford to attend the all day meeting. Your committee met and discussed the matter with the committee of the Water Works Association, and the members of each Society were invited to attend both outings. Your committee believes that its action was approved as the attendance at the inspections was about one hundred and at the Park about forty.

Following the custom started two years ago light refreshments and cigars have been furnished preceding most of the regular meetings. We admit that on one night your Committee forgot to provide food. From the remarks that came back to the Committee following this oversight there can be little doubt but that the free meals are really looked forward to and enjoyed by a large number of members.

For the benefit of our successors in office we wish to recite a few of the difficulties met with in dispensing food and drink.

The post-war readjustment has proceeded so far that now sandwiches may be purchased for 8 cents each in bulk. Until we made this discovery we followed the example of our predecessors, buying about 8 lineal feet of bread per hundred persons to be fed, and then laboriously, with main strength and ignorance, manufacturing it into sandwiches. This was economical. Very few sandwiches were eaten. Unfortunately, however, after a meal served by last year's committee one of our respected members had to be carried out of the hall during the literary exercises of the evening, due to acute gastric distress. Having deep regard for the physical welfare of the members we finally abandoned the home-made product in favor of that manufactured by professionals.

The greatest difficulty your committee has encountered is that of estimating the appetites of the members. The first night the engineering society of the Northeastern College attended en masse, the food ran out long before the multitude was completely filled; and the night of the big snowstorm the ratio of sandwiches to participating members was exactly 8. We are discouraged. We give it up as a bad job.

Respectfully submitted,

(Signed) Scott Keith.
John M. Cashman.
Waldo F. Pike.
Erwin Harsch.
Harrison P. Eddy.

Report of Committee on Licensing Engineers.

Boston, Mass., March 15, 1922.

To the Board of Government, Boston Society of Civil Engineers:

Gentlemen, — The Joint Committee on Licensing Engineers was continued through the year ending March, 1922, with the same personnel representing the Boston Society of Civil Engineers as the previous year, and with authority, as before, to invite other engineering societies to authorize their representatives to continue or join with it, thereby being perpetuated as a joint committee. A schedule of the membership, with the changes in and additions thereto, is appended.

The Joint Committee has held two meetings during the year; the first on April 21, 1921, at which a majority report to the various member societies was prepared and signed by twelve of the thirteen members of the Committee, a copy of which is published in the Journal of the Boston Society of Civil Engineers for June, 1921, page 7*. The second meeting was held on September 13, 1921, to consider a circular letter sent out by the Executive Secretary of the Federated American Engineering Societies, requesting the attitude of engineers throughout the states as to licensing or registration, and inviting those interested to assist by presenting their views in writing or in person to the Committee on Licensing of the Federated American Engineering Societies at a meeting to be held by that committee in Chicago on September 19, 1921. The following letter was prepared by the Joint Committee and forwarded to the Executive Secretary of the Federated Societies, and was sent by him in turn to the meeting at Chicago:

Boston, Mass., September 13, 1921.

Mr. L. W. Wallace, Executive Secretary,
Federated American Engineering Societies,
719 *Fifteenth* Street, N.W., Washington, D.C.

Dear Sir:

At a meeting of the Joint Committee on the Licensing of Engineers, composed of fifteen representatives of ten of the principal engineering and architectural societies in Massachusetts, held this day, the following resolution was adopted:

"While it is the belief of this Committee that no benefit will accrue to the public if any laws licensing engineers are to be or have been passed, this Committee recommends to the forthcoming conference on licensing, to be held in Chicago on September 19, 1921, the advisability of requesting the American Engineering Council to consider the preparation of a uniform law for the licensing of engineers and to take such action as it deems advisable toward encouraging the general adoption of such a uniform law in those states which have already passed, or are about to pass an engineer's licensing law.

"This Committee further calls the attention of the American Engineering council to the report of the Joint Committee on Licensing Engineers in Massa-

chusetts, dated April 21, 1921, (a copy of which is appended) with particular reference to the general discussion and comments therein on the general principle and desirability of the licensing of engineers."

Very truly yours,

(Signed) EDWIN H. ROGERS,
Chairman, Joint Committee on Licensing of Engineers.

The licensing or registration of professional engineers has not been considered by the Massachusetts Legislature during the current session of 1922.

It is recommended that the Licensing Committee of the Boston Society of Civil Engineers be continued as before, with authority to continue its existence as a joint committee with representatives of other local engineering societies as a part of its membership.

Respectfully submitted,

EDWIN H. ROGERS,
Chairman, Joint Committee on Licensing of Engineers.

PERSONNEL OF JOINT COMMITTEE ON LICENSING OF ENGINEERS.

Representing Boston Society of Civil Engineers.

Charles T. Main,
Charles M. Spofford,
Charles R. Gow
Charles W. Sherman
Irving E. Moultrop
Edwin H. Rogers, *Chairman.*

Representing Boston Section, American Institute of Electrical Engineers.
Alexander Macomber
(vice Lewis W. Abbott)
from Sept. 9, 1921.

Representing Boston Section, American Society of Mechanical Engineers.
Arthur L. Williston

Representing Boston Society of Architects.
Clarence H. Blackall

Representing Boston Section, American Society of Heating & Ventilating Engrs.
Allen Hubbard

Representing Boston Section, American Inst. Mining & Metallurgical Engrs.
Edward E. Bugbee

Representing Boston Society of Landscape Architects.
Bremer W. Pond

Representing Northeastern Section, American Chemical Society.
Robert W. Neff
from April 21, 1921.

Representing Boston Chapter, American Association of Engineers.
Frank C. Shepherd
(vice Harry Sharpe)
from August 16, 1921.

Representing Engineering Society of Western Massachusetts.
Frederic H. Fay
from September 8, 1921.

Representing American Institute of Chemical Engineers.
Dr. Arthur D. Little
Robert Spurr Weston

Arthur L. Gardner
from October 21, 1921.

Representing Northeastern Section, American Society of Civil Engineers.
Burtis S. Brown
from December 13, 1921.

Report of Committee on Contractual Relations.

Boston, Mass., March 13, 1922.

To the Board of Government, Boston Society of Civil Engineers:

Gentlemen, — Your Committee appointed to consider and report upon eight important principles of contractual relations to be used in a standard contract document prepared as a part of the National movement inaugurated by Secretary Hoover, presents herewith as its report the report of a Joint Committee, which is the result of the combined efforts of your Committee and those of a similar Committee appointed by the President of the New England Water Works Association.

Yours very truly,

John L. Howard, *Chairman.*

Report of Joint Committee on Principles of Contractual Relations.

Boston, Mass., March 10, 1922.

The Joint Committee on Principles of Contractual Relations was formed by uniting the two committees appointed by the President of the Boston Society of Civil Engineers and the President of the New England Water Works Association, respectively.

The organization and membership of the Joint Committee is as follows:

Officers

Chairman, John L. Howard. Secretary, Frank A. Marston.

Members

Boston Society of Civil Engineers:
John L. Howard. Arthur C. Tozzer.
Frank B. Walker.

New England Water Works Association:
George A. Sampson. William G. Starkweather.
Frank A. Marston.

A national movement was started by Secretary Hoover of the Department of Commerce in December, 1921, looking toward the preparation of standard contract documents, which is worthy of the coöperative effort of all engineering societies. The conference called by Secretary Hoover, which was attended by representatives from nine of the national engineering societies, prepared outlines and appointed special subcommittees to undertake certain work looking forward to the standardization of construction contracts as far as possible, with the hope that such work would ultimately result in;—

1. Less expenditure for legal services in drawings proper contracts, and the elimination of disputes over contracts already drawn.
2. Less duplication of work in the profession attendant on construction.
3. Better safeguard for owners and increased public confidence.
4. An improved standard of construction service throughout the country.

The engineers, architects and contractors who approved this plan represented the following associations:

American Association of State Highway Officials,
American Engineering Council,
American Institute of Architects,
American Railway Engineering Association,
American Waterworks Association,
American Society of Civil Engineers,
Associated General Contractors of America,
National Association of Builders Exchanges,
Western Society of Engineers.

The work of this Joint Committee has been limited to a consideration and report upon the eight important principles of contractual relations prepared by a special committee working along the lines outlined by Secretary Hoover's conference.

These eight principles were published in "The Constructor", which is the national publication of the Associated General Contractors, January 1922, page 19, as follows:

1. The award of contracts on a basis of skill, integrity and responsibility with the policy where practicable of eliminating irresponsible or inappropriate bidders before their proposals are received.
2. A satisfactory arbitration clause to be legally binding upon both parties.
3. A definite policy of inspection, with provision that if two or more separate interests are concerned in payment one authority shall act for all.
4. Specification of either the results to be obtained or the method to be followed, but not both.
5. Acceptance of work within a definite period after fulfillment of the contract, and as short a period of maintenance as is practicable.
6. Removal of responsibility from the contractor for contingencies beyond his control.
7. Reasonable limit upon the amount to which work under the contract can be increased or decreased.
8. Definite time and method of payment with provision for payment for materials delivered.

In considering these principles the Committee has felt that there were many other principles and questions which warranted careful study, as well as the eight outlined above, but because of limited time and because the work of the Committee was practically restricted to a consideration of these eight principles, study has not been given to the many other questions, some of them most perplexing, which would be involved in the complete study necessary for the preparation of standard contract documents.

It is believed that as a matter of general principle, contracts should be drawn so as to be as specific as possible, and specifications should be sufficiently complete when supplemented with detailed contract drawings, to make clear the amount and character of the work to be done, methods to be followed (where special methods are required) and all other details described, in sufficient clearness to prevent as far as possible misunderstanding, and to reduce to narrow limits the possibility of disputes and disagreements. It is felt that by these means much can be done to bring about more equitable conditions on construction work, from the viewpoint of the Owner, the Engineer and the Contractor.

A study of the eight principles above outlined, can only be made on a basis of broad interpretation. In public work, political conditions, existing statutes and other factors make it impracticable to follow out some of these principles.

Therefore, in interpreting the principles which are endorsed by this Committee in the following paragraphs, it should be borne in mind that the intention is that they are to be considered only on a broad basis, for adoption where conditions permit; that they cannot be taken literally in all cases; and that every construction contract, cannot be written to include all of the principles. Furthermore, there are other principles of equal importance which should be incorporated in the same way, and which should be given due weight

in writing a contract for construction work. The time available to this Committee for its work has not permitted a consideration of these other important factors, except indirectly as they may have had a bearing on the principles hereinafter stated.

With the general qualifications hereinbefore given, this Committee endorses the following principles of contractual relations: —

1. That proposals be invited only from responsible bidders; and that contracts be awarded with due regard to skill, integrity and experience.
2. (The conditions appertaining to different clases of work vary to such an extent that the Committee does not feel prepared to endorse the principle of arbitration for universal application, although recognizing its desirability in many cases.)
3. That if two or more separate interests are concerned, one authority shall act for all.
4. That as a matter of general principle, either the results to be obtained or the methods to be followed shall be specified, but not both where they would conflict.
5. That work be accepted within a definite period after the fulfilment of the contract; and that as short a period of maintenance be required, as is practicable.
6. That the contractor be relieved of certain responsibilities for specified contingencies beyond his control.
7. That where the character of the work will permit there should be a stated limit upon the amount to which work under the contract can be increased or decreased, due to a change in plan.
8. That there be a definite time for, and method of, payment; and that where practicable and advantageous there be provision for payment for certain specified materials delivered, for the safekeeping of which the contractor shall be responsible.

We submit this report with the recommendation that it be endorsed by the Boston Society of Civil Engineers and the New England Water Works Association, for the sake of coöperating in the national movement leading towards the preparation of standard contract documents, insofar as such a project is feasible.

Endorsements of these principles, or any action taken in regard to them, should be transmitted to Mr. W. P. Christie, Secretary of the Conference, Munsey Building, Washington, D.C.

We believe that it is possible to prepare a standard form of contract, including only such general clauses as would be applicable to all construction contracts, or perhaps to certain classes of construction contracts, so that the general procedure covered by such clauses will be standardized, to the great benefit of all parties concerned in construction work.

Respectfully submitted,

(Signed) JOHN L. HOWARD, *Chairman.*
ARTHUR C. TOZZER.
FRANK B. WALKER.
GEORGE A. SAMPSON.
WILLIAM G. STARKWEATHER, by F.W.M.
FRANK A. MARSTON, *Secretary.*

Report of the Editor.

To the Board of Government, Boston Society of Civil Engineers:

Gentlemen, — The Editor submits the following report for the calendar year 1921.

There have been published 16 papers and 7 memoirs of deceased members.

The 10 issues of the Journal of 1 250 copies each contained a total of 674 pages.

The net cost was $3 537.91, or $5.25 per page. In 1920 the net cost was $2 944.95 and the cost per page was $4.71. The increased cost was largely due to very expensive inserts in the September issue.

Printing costs for the coming year will be considerably less than in the past few years.

The amount of advertising matter carried was somewhat less than in 1920 but this source of revenue doubtless can be restored with a return of more normal industrial conditions.

In the appended table are shown, in tabular form, figures of cost, number of pages and other details.

Respectfully submitted,

W. L. Butcher, *Editor*.

1921 JOURNAL.

Month	Pages of				No. of		Cost of							
	Papers	Proc.	Index.	Adv. (inc. Index and Other Unpaid Space).	Inserts.	Cuts.	Papers, Proc. and Index (inc. Stock for Adv. Pages).	Inserts and Cuts.	Adv.	Reprints.	Postage Wrapping and Mailing.	Editing.	Incidentals.	Copyright.
Jan.	52	14		19		10	480.11	$40.43	$39.00	$45.00	$30.79		$4.40	
Feb.	20	14		$18^{11}/_{12}$			252.27		31.25	23.50	27.14		5.00	
Mar.	50	8		17		13	415.50	51.82	43.45	53.00	37.64		.12	
Apr.	34	32		17			325.07		28.00	37.50	25.19			
May	46	8		17		8	366.04	43.86	27.25	43.50	27.15		5.00	
June	28	18		17		15	257.94	74.33	31.75	24.00	21.58			
Sept.	60	12		15	2	9	367.72	346.53	44.05	51.00	25.68		5.00	
Oct.	20	10		$14\frac{1}{2}$		1	179.29	6.60	55.05	24.09	29.10		.12	
Nov.	14	6		$14\frac{1}{2}$			142.26		26.50	16.58	22.52		50.00	
Dec.	28	8	8	$14\frac{1}{2}$			264.81		26.50		26.50			
	352	130	8	$164^{5}/_{12}$*	2	56	$3 051.01	$563.57	$352.80	$318.17	$273.29	$450.00	$69.64†	$10.00

* 184 pages used not all set solid.

† Includes $45 for wrappers for mailing purposes and $20 second class postage.

Gross cost		$5 088.48
Receipts, sales of JOURNALS and subscriptions	$156.07	
Advertisement	1 336.00	
Reprints	58.50	1 550.57
Net cost		$3 537.91

APPLICATIONS FOR MEMBERSHIP.

April 15, 1922.

THE By-Laws provide that the Board of Government shall consider applications for membership with reference to the eligibility of each candidate for admission and shall determine the proper grade of membership to which he is entitled.

The Board must depend largely upon the members of the Society for the information which will enable it to arrive at a just conclusion. Every member is therefore urged to communicate promptly any facts in relation to the personal character or professional reputation and experience of the candidates which will assist the Board in its consideration. Communications relating to applicants are considered by the Board as strictly confidential.

The fact that applicants give the names of certain members as reference does not necessarily mean that such members endorse the candidate.

The Board of Government will not consider applications until the expiration of twenty (20) days from the date given.

FAIR, GORDON M., Cleveland, O. (Age 28, b. Burghersdorp, So. Africa.) Educated at the Royal Technical College, Germany, Harvard University and Massachusetts Institute of Technology, and received the degree S.B. from the two latter. Served in the Canadian Army during 1916–17 after which he was engaged in research work on water purification for the R. U. V., also in New York City under supervision of George A. Johnson. In September 1918 he was appointed instructor in Sanitary Engineering in Harvard University during which time he was engaged in studies of water supply and sewage disposal as assistant to Prof. Whipple. In January 1921 he was appointed as assistant chief of the Division of Sanitation of the League of Red Cross Societies in Geneva, Switzerland. At present is Director of the Bureau of Statistics and Research of the Cuyahoga County Public Health Association in Cleveland, O. Refers to H. W. Green, A. Hazen, H. J. Hughes, C. M. Spofford, G. C. Whipple.

LOCKMAN, EDWARD LESLIE, Somerville, Mass. (Age 43, b. Lisbon, O.) He began railroad service with the Union Switch & Signal Co., in September, 1898; in the signal department of the N.Y., N.H. & H.R.R. from 1899–1901; signal maintainer with the Boston Elevated from 1901–1903; foreman of signal construction 1903–1905; general foreman signal department 1905–1912; assistant road master of rapid transit lines from March 1912 to December 1920, when he was appointed assistant engineer of surface lines in which work he is at present engaged. Refers to C. T. Fernald, H. C. Hartwell, A. T. Sprague, Jr. and H. M. Steward.

LIST OF MEMBERS.

ADDITIONS.

FLOOD, FRANK L. ..... 431 Concord St., Framingham, Mass.
FOWLER, WILLIAM H. ..... 176 East Foster St., Melrose, Mass.
HALE, HAROLD W., ... 166 St. Botolph St., Boston 17, Mass.
HANLEY, J. MERRILL ..... 25 Austin St., Milton, Mass.
HOBBS, SAMUEL ..... 7 Fairview Ave., Reading, Mass.
NYMAN, CHESTER L. ..... 42 Church St., Marlboro, Mass.
OAKMAN, ROGER G. ..... 41 Walnut St., Neponset, Mass.
PEARCE, HOWARD T. ..... 166 St. Botolph St., Boston 17, Mass.
RUSSELL, JOHN B. ..... 21 Eliot St., Quincy 69, Mass.
WILKINS, HENRY M. ..... 23 Abbot St., Marblehead, Mass.
WILLIAMS, FREDERICK C. ..... Wilson Dam, East Florence, Ala.

CHANGES OF ADDRESS.

CANNON, MADISON M. ..... 161 Devonshire St., Boston, Mass.
DUFOUR, FRANK O. ..... Lafayette College, Easton, Pa.
DURHAM, HENRY W. ..... 2 Rector St., New York, N. Y.
EISNOR, JOHN J. ..... 404 Highland Ave., West Somerville, Mass.
EMERSON, RALPH W. ..... 18 Church St., Pittsfield, Mass.
HANNAN, WILLIAM E. ..... 45 Edwin St., Dorchester, Mass.
LONG, WILLIAM J. ..... Woonsocket, R. I.
MCCORKINDALE, RALPH I. ..... 116 Hubbard St., Ludlow, Mass.
NAWN, HUGH ..... 82 Savin St., Roxbury, Mass.
NAWN, LEO J. ..... 82 Savin St., Roxbury, Mass.
PERRY, CHAUNCY R. ..... 73 Worcester Lane, Waltham, Mass.
PRICE, HERMAN S. ..... U. S. Land Office, Santa Fè, N. M.
STEARNS, RALPH H. ..... Room 1207, 8 West 40th St., New York, N. Y.
YOUNG, ERVING M., ... The Dawes House, Lawrenceville, N. J.

DEATHS

NELSON, WILLIAM ..... March 13, 1922.
HOWE, WILL B. ..... April 1, 1922.

RESIGNATIONS.

BANCROFT, LEWIS M.
BAYLEY, FRANK A.
BOURNE, FRANK B.
BRESTH, ALEXANDER
BROWN, ALBERT F.
CAIRD, A. WINTON.
CLARK, WILLIAM A.
DONOVAN, FREDERICK P.
EMERSON, GEORGE D.
ETTER, HAROLD P.
HATHAWAY, ERWIN O.
HASTIE, FRANK B.
JONES, FREDERICK E.
KIMBALL, HERBERT S.
MOODY, HERBERT A.
PUTNAM, HAROLD W.
RICH, MALCOLM
ROPES, HORACE,
ROSS, ELMER W.
SHAW, EDWARD W.
SHERMAN, EDWARD C.
SHUTE, GEORGE P.
SKILLIN, FRED B.
STRATTON, GEORGE E.
STROUT, HENRY E., Jr.
TREADWELL, EDWARD D.
WOOD, CARL W.

LIBRARY NOTES.

Book Review.

"Sewerage and Sewage Disposal." A Textbook by Leonard Metcalf and Harrison P. Eddy, First Edition. McGraw-Hill Book Company Inc., New York and London. Cloth, 6 x 9 in.; pp. 598; illustrated, $5.00.

Reviewed by Dwight Porter.*

This work is in response to a demand which has existed since the publication some seven or eight years ago of the three volumes devoted to "American Sewerage Practice" for an abridgement within a single volume for class use in engineering schools. There is a wide difference in the amount of time given to the general subject in various institutions, but the authors have sought to present the information "which they consider it desirable for the young student to acquire before taking up work in this field." Their long experience as sanitary engineers and their wide contact with teachers and with young graduates invite confidence in the soundness of their judgment in this matter. They have produced a book which should be ample for the needs of any undergraduate specialized course in sanitary engineering, and which by judicious use can be adapted to the briefer requirements of less highly specialized courses in civil engineering. It contains upwards of two hundred illustrations, mainly line drawings and diagrams, clearly drawn and fully lettered, many of them taken from the office practice of the authors.

The first half is given to sewerage, — general considerations governing sewer systems coming first, followed in turn by estimation of volume of sewage and of storm water, description of various sewer appurtenances and special structures, and three chapters relating to surveys, office work, materials, and the construction of sewers. These latter chapters are so largely concerned with details which, though of practical importance, would be of questionable service for class assignment, that they may be regarded as mainly useful for general purposes of re-

* Prof. Hydraulic Engineering, Mass. Inst. of Tech., Cambridge, Mass.

ference. Noticeably helpful features are a design worked out in detail for a separate system for an existing sewer district of between one and two hundred acres; later a design by the rational method for a storm-water system for the same district; a set of a dozen practical problems for applying hydraulic principles governing velocity of flow to special cases; and a solution worked out for the design of a multiple-pipe inverted siphon which occurred in the author's practice.

Sewage disposal is introduced by a chapter on the chemical and biological characteristics of sewage, explaining the meaning and significance of various analyses, of the nitrogen cycle, of putrescibility tests, giving outlines of standard laboratory methods, and so on. The balance of the book, with the exception of the final chapters, deals successively with disposal by dilution and with the different prominent methods of sewage treatment, with especial fulness in the case of trickling filters and the activated sludge process. The purpose of the authors has obviously been not merely to describe in a general way treatment processes, but also to add data, practical instructions and suggestions which should lend themselves to the actual design of works. Their extended experiences as designing engineers of such projects fits them admirably to do this. Evidence of this purpose is general through the chapters under consideration, but attention may be called specifically to articles on the design of grit chambers, of horizontal-flow tanks, of chemical precipitation tanks, and of siphonic dosing apparatus for trickling filters.

General methods of estimating cost are explained in the final chapter, which will be much appreciated by students. The volume here noticed in outline is characterized by simple, common sense statements of underlying principles, logical arrangement in their application, and clearness of expression. It furnishes an addition of great and enduring value to the literature of sanitary engineering, and for it gratitude is due alike from engineers, teachers and students.

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Mortality Statistics. Bulletin 148.

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Library Committee.

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BOSTON SOCIETY OF CIVIL ENGINEERS
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PAPERS AND DISCUSSIONS

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ADDRESS AT THE ANNUAL MEETING.

By Robert Spurr Weston, President, Boston Society of Civil Engineers.

(March 15, 1922.)

Some Engineering Practices and Ideals.

My memory of the addresses of past presidents of this and other engineering societies is a complete covering of all phases of professional practice. There seems nothing left unsaid about what has gone before. On the other hand there is much new engineering food which needs rumination. Some of this is as yet so raw and so untried that it is unfit for mental refreshment, — some of it a hash of what has been served before under another name. I am therefore running the risk of seeming obviously trite on the one hand, or visionary on the other, in choosing as a subject, — "Some Engineering Practices and Ideals."

In discussing this subject, I shall hope to illustrate the individualistic and coöperative practices of engineers, and the ideals upon which they are based.

The term engineer can be used to describe a wide variety of callings, some of them commercial, some of them having only the remotest connection with true professional work, but for a while let us turn away from the ideas of running engines and machines, the measuring of energies, objects and values, and bear in mind the higher side of engineering, — the work of the scientific imagination, the grouping of images into a mental picture, the development of design by logical processes of thought, and the

realization of these in plans, specifications, in public support and in the finished work. In our minds at least, let us spell ourselves *ingeniers*, the mediaeval Latin term describing those who *ingeniate*.

Before the days of organized schooling for professional engineers, even as late as the days of the guild and the apprentice, great works were few, and were performed by a race of supermen, — men whose individual minds encompassed most of the engineering knowledge of their time; men who, by sheer force of intellect and character, and usually in spite of ignorant opposition and the lack of facilities, accomplished marvels in the way of raising the level of human living. No ordinary man could do what they did.

Consider for a moment the difficulties presented to the inventor of the first wheel, the first arch, the first aqueduct. Consider Cromwell's opposition at a later time to the recovery from the sea of England's best arable land by the early engineers.

In the 15th century, Leonardo Da Vinci was an illustrious example of the highly developed individualist. He was painter, sculptor, scientist, architect and engineer. He stood apart from his fellows like an isolated Monadnock, many-sided, strong, enduring and solitary. Engineering was but one facet of the gem of his personality, but on this side he was a master by the force of his own character, his hunger for truth, and his resourceful ability.

Consider Watt holding a spoon over the spout of a steaming kettle in his mother's kitchen. Consider his precocity in mathematics and science, his delicacy of body and his achievement after years of anxiety and labor, and with the help of Bolton, of the steam engine as a commercial machine. Consider his seeming universal knowledge and his eminence among inventors and discoverers of all time.

Consider the poor colliery fireman's child, George Stephenson, and the enormous development of his character and mind which resulted in the " Rocket " and the steam railway.

Also Brunel, who built the Great Eastern while he was also building his largest bridge, a dock, and personally supervising railway construction in India, Italy and England.

Among these examples of illustrious individuals, Leonardo Da Vinci may be considered as belonging to the monastic, the early English engineers to the aristocratic, and the modern engineer to the democratic type. It is of the growth of democracy in engineering through coöperation that I would speak further.

With the steam engine, the railway and the steel-screw ship came a demand for many engineers. There was more work than there were self-trained geniuses. The first recourse was to military engineers trained to some extent to build roads and bridges. For a while they sufficed, but the field broadened, the work grew and specialized. The military training no longer sufficed even for the superman, and electricity began its work in industry. It must not be forgotten, however, that with the development of the schooled engineer, certain natural characteristics of mind were not so highly developed among the general run. To illustrate by an aphorism from a note book of Leonardo Da Vinci, "When science put a knife — an artificial weapon — in man's hand, he lost the use of his nails — his natural weapon."

In Great Britain, the standardization of engineering by professional training began at Glasgow University in the 1830's, with Rankin, an early graduate, teaching all of the branches of the art a few years later, and in this country with the founding of Rensselaer Polytechnic Institute in 1826.

The first technical schools were simple affairs and were often expansions of Departments of Mathematics; but knowledge increased, libraries grew, practice ramified, and the profession began to specialize. The field grew too broad for men, even those of the genius type, to work alone, and the specialties multiplied.

At the beginning of the Great War, while some of the specialties called engineering lay in the field of commerce, and the dividing lines between specialties were faintly defined, many kinds of engineers had been named and had grouped themselves in numerous societies. I am inclined to believe that while this extreme specialization is partially the result of methods of thought and training, particularly in our technical schools, it has resulted mostly from the great diversity of jobs which the

engineer is asked to do, and the disinclination or the financial inability of the average student to prepare himself along broad lines.

There is quite a group of engineers who belong to a number of technical societies, and are difficult to classify. The best of these are the professional descendants of the early engineers. In their breadth of interest, they remind me of the remark of a dear old lady of wide experience who, in her 80's, is still active in good works. Being asked what was her church, she replied, "My father was a Baptist, my mother a Methodist, my husband a Congregationalist with strong leanings toward Unitarianism, while I am interested in Spiritualism, see good in Christian Science, and the Swedenborgians believe I could easily become one of them. Now will some one tell me where I belong?"

Many of this group divide their interests and energies and become ineffective thereby. They become discouraged by the number of contacts, — time-consuming and expensive, — which under present condition a broadening of interest demands. The more highly developed of this group, because of their greater energy, see vast problems in true perspective, and because of their wide connections are able to coördinate large undertakings. Even these leaders realize the handicap of present conditions, but for the others there must be coöperation or ineffectiveness.

Consider how the development from the individual to the social or coöperative type is paralleled by the evolution of animals. In the lowest forms of these, the amoeba, for example, a single cell performs the functions of locomotion, feeding, digestion and reproduction. Then we see developed in still higher forms, organs of locomotion; a mouth; digestive, circulatory and nervous systems; and specialized organs of reproduction. In lower forms, as in the European oyster, there is no sex differentiation, the parent being both male and female. Higher in the scale begins the differentiation of sex and the development of the higher faculties and the social instinct, most marked in the highest races of man.

Highest among insects are the ants and bees, and while we may not quite follow Mäterlinck to believing that bees are

perfect models for human communities, they do exhibit a high degree of coöperation with specialization, acting under the "spirit of the hive" for the greatest good of their community, and in doing so exhibit virtues of courage, self-sacrifice, affection, industry, thrift, contentment, cleanliness and chastity, which human beings might well emulate. Their only defect seems to be the lack of a spirit of service for others, as exemplified by the inhospitality of even the highest type of hive.

Likewise, the wolves, among the most intelligent of mammals, hunt in packs and achieve results impossible for the individual. Indeed, Kipling reminds us that even in the jungle where the weak and aged die violent deaths,

> "The strength of the pack is the wolf,
> And the strength of the wolf is the pack."

I am not one who believes that the engineer is indifferent to public service. In fact, in proportion to his opportunities and means, he has done his part. It is difficult for the engineers, few in number, to make an impression on a community dominated by larger groups, or to render personal service to society on the minimum living wage. It is only with the organized effort of the whole engineering group as a background that the work of the individual engineer can be placed in its right light before the public.

I have called your attention to coöperation by education, and by grouping into societies, but to bring into effect the mass action of engineers and technicians as a leavening force in society, and to do this without waste, coöperation of societies is necessary. This was the real reason for founding the Federation of American Engineering Societies, and the affiliations of local technical societies.

Many questions have been asked regarding the activities of the Federation of American Engineering Societies, and the value of supporting this new organization, — one year old last January.

I may not take time to describe the Federation, but feel sure that the failure of some members of this Society to contribute to its support is due in great part to a lack of sufficient acquaintance with the work which the Federation is doing.

Every effective social group in the country has taken to heart the moral of Aesop's fable of the wood cutter and the twigs, which illustrates the strength of union; and nearly all of these groups are represented in Washington more or less effectively. Many of these organizations are self-seeking, but we are proud that the Federation has held to a high ideal of service. Out of thirty important accomplishments of the first year, less than one fifth directly benefited engineers, and in this fifth are included the active support of bills for completing the topographical map of the United States, for commissioning sanitary engineers in the Public Health Service, for the reclassification of grades and compensations of engineers in public service, for licensing engineers in the states, the placing of more than 1 200 engineers in employment, and also the establishment in the public mind of the role which engineers play and should play in modern civilization, — none of which is entirely without benefit to the whole people.

The best accomplishment of the Federation, to my thinking, is the feeling engendered at the Capital that the Government has now a definite point of contact with the whole engineering profession, and engineers may be depended upon for unselfish public service, — to give without the expectation of getting.

Through the Federation, this Society has a new and efficient channel of communication with the Government, and we have already used this to express our opinion regarding matters of national importance. But it is of more importance to my mind in preventing unwise and abortive actions by the local societies on matters which affect the whole country. For example, the Federal Water Power Bill, in which our Society was interested, is now being carefully studied by the Federation, and this study should result in logical steps being taken which should lead to proper modifications of legislation. Had the matter been presented to the Government in the usual way by this society alone, it would not have met with the respectful consideration which it is now receiving.

The Boston Society of Civil Engineers has just voted to join the Affiliated Technical Societies of Boston, one practical advantage of which will be a sufficient reduction in expenses to

allow an increase in society activities including membership in the Federation. While this Society will undoubtedly have less freedom of action as a member of the Affiliation, here again should the benefits of coöperation outbalance its disadvantages. This new affiliation bears an analogous relation to its members and to New England to that the Federation bears to the member societies and the country.

While it is too soon to promise what this affiliation can accomplish, the desired ends have been set forth in an illuminating way by our Committee on Intersociety Relationships, and the movement should have the hearty support of every member.

By living in one house, different kinds of engineers should become more sociable and better acquainted, more tolerant of one another's ideas, make use of each other's special abilities more frequently, and become more familiar with the various applications of science to engineering and technology. Many engineers have a deep understanding of *things*, but often lead lives of disappointment. A frequent cause is their failure to understand *men* as well. In any human undertaking, human understandings are most important, and it is believed that by increasing contacts, individual members of the Affiliation will gain in this important respect. All of us desire a true appreciation of the merits of the engineer by the community, and to have his work better known.

While blatant advertising, especially by professional men, is distasteful, and it is far more important to be worth knowing than known, there are many who would profit greatly and contribute more to society by simply being neighborly and by elevating professional acquaintance to the high plane of friendship. In so doing, they would draw upon the great emotional reservoirs, the power of which we manipulators of material forces and things often fail to sense. In a friendship is found the highest type of service, and therein lies success.

If engineers coöperate by taking to heart the value of extending the limits of the personal relationship and the responsibility for service which it brings, I feel that we need show little interest in laws for the regulation of engineering practice, and codes of ethics would have only an educational value.

Self-sacrificing service is the highest form of coöperation and furthermore develops the highest type of engineer. This idea is as old as the Book of Tao and the supreme theme of the Sermon on the Mount. It is the only one which can develop the character of the engineer, and enable him to fulfill his destiny in his community, his country and his world. It can gain much strength through the incorporation of a democratic community of engineers. That the new Affiliation will prove to be such an organization is the hope of its promoters.

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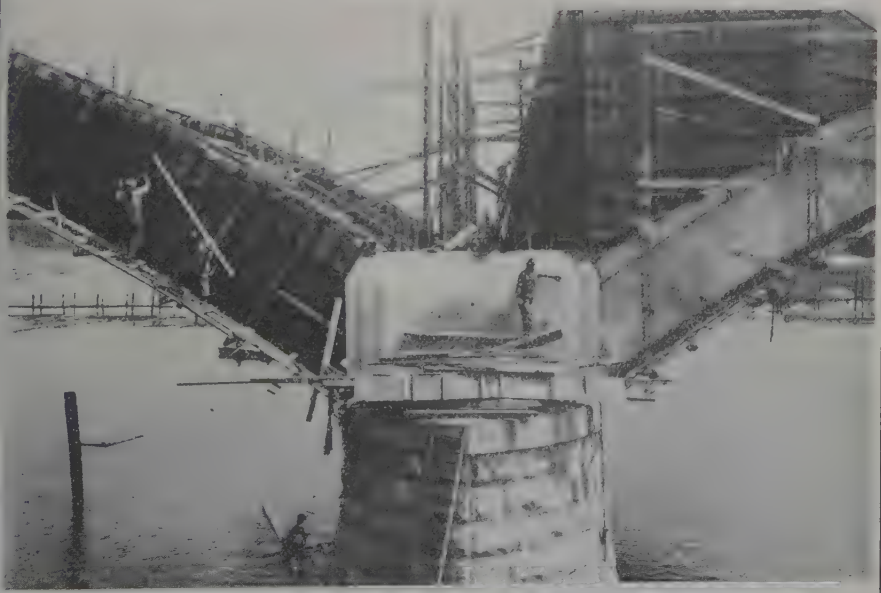

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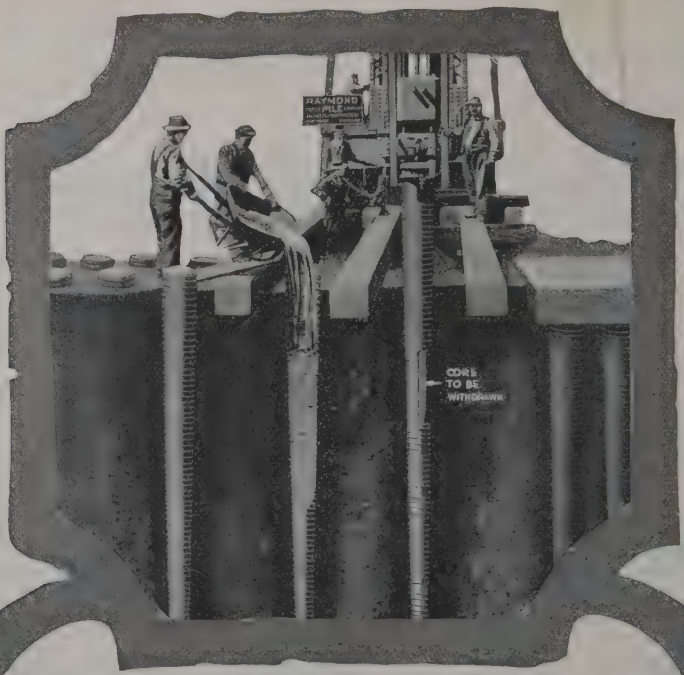

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